VERA C. RUBIN OBSERVATORY

Quadnotch Filter

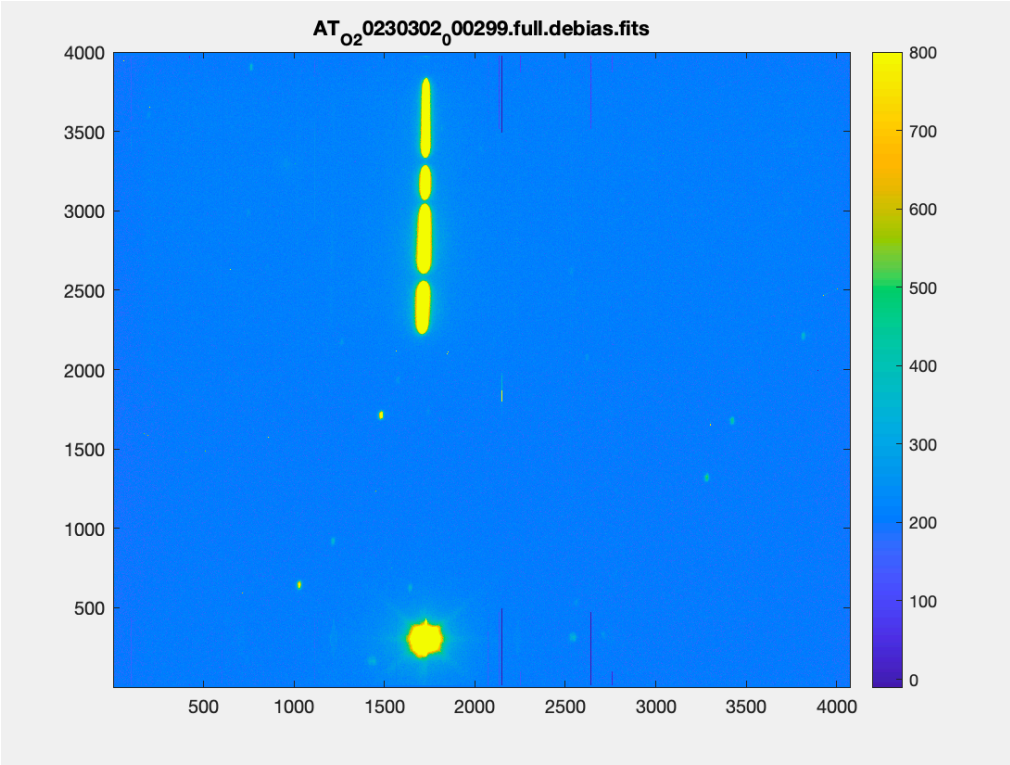
Photometric reduction of Auxtel data

August 10th 2023

NSF AURA U.S. DEPARTMENT OF ENERGY SLAC CHARLES AND LISA SIMONYI FUND FOR ARTS AND SCIENCES LSST CORPORATION

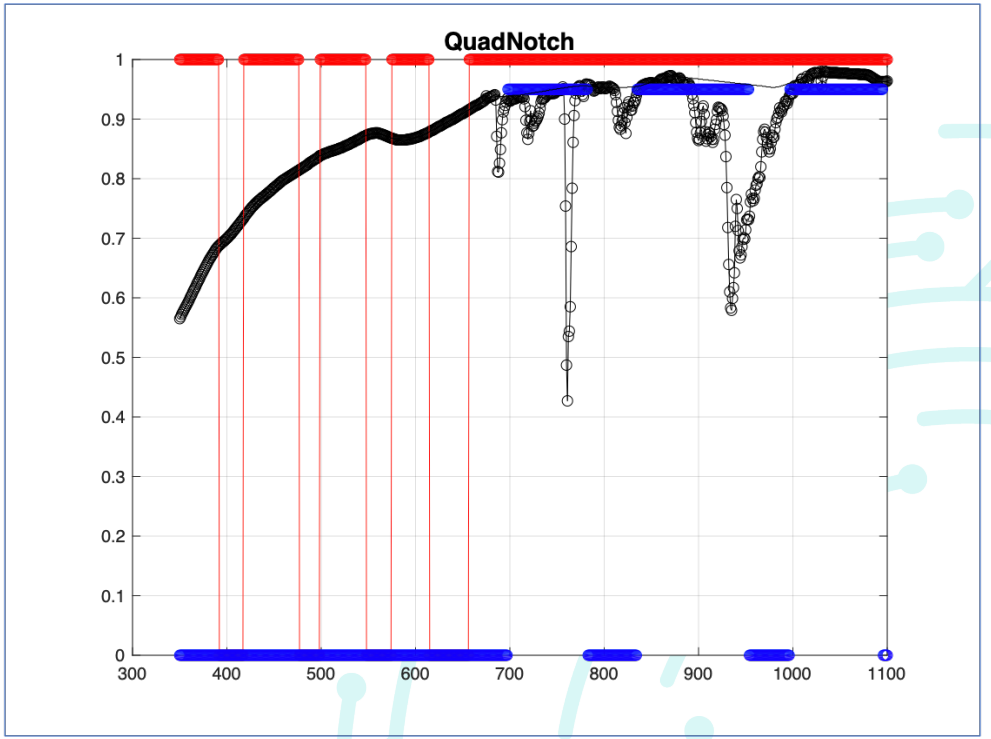
How to use the Quadnotch data

- 2 Options:
  - Spectrophotometric
  - Photometric
- This talk will focus on second!
- Photometric:
  - We measure the same star at different airmasses.
  - Plot out the flux/magnitude of each band or the corresponding colors
  - Do linear regression to obtain extinction and zero airmass magnitude



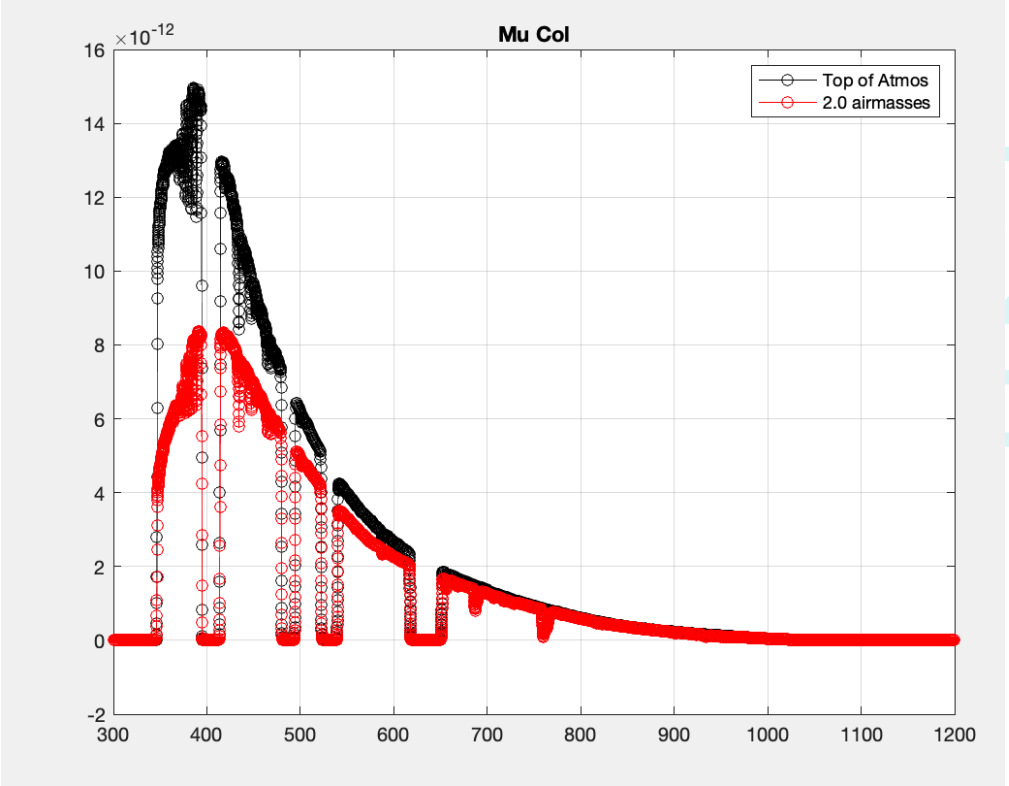
Quadnotch background

- Just a quick reminder:
  - Extinction depends on both airmass and wavelength.
  - The bluer the light the more extinction
- We hope to use this to measure excess extinction compared to Rayleigh scattering



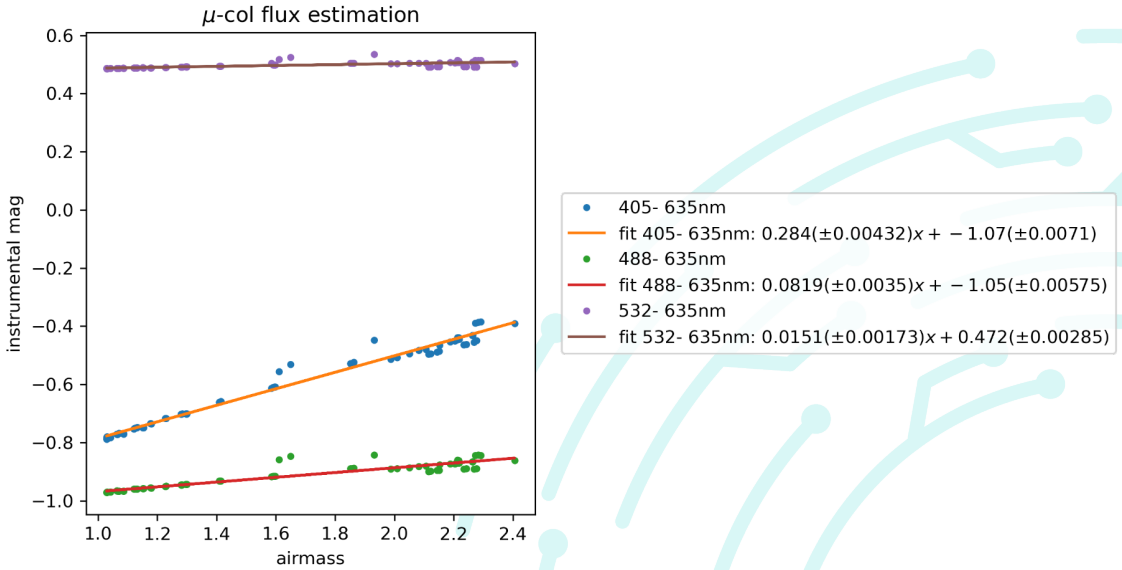
Quadnotch modelling

- We do a modtran model
- Gives us the Rayleigh scattering part
- For each flux band / color:
  - We can compare the linear regression to the models estimate of



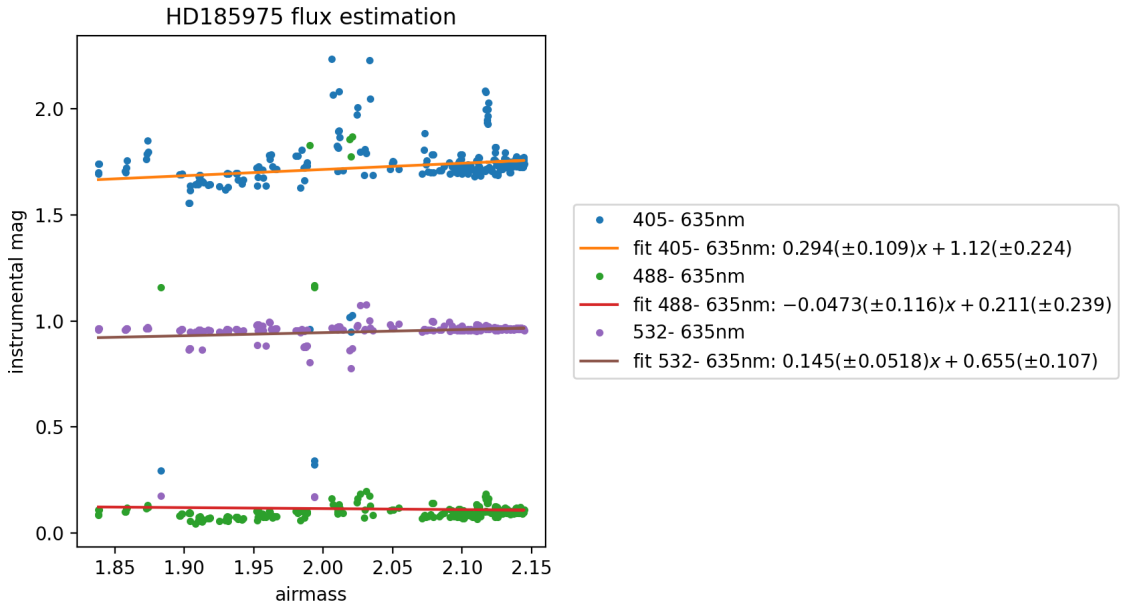
Results: Mu-Col (HD 38666)

- We use colors,
  - We name them by the nominal centers of the fluxes:
    - 405 - 635nm
    - 488 - 635nm
    - 532 - 635nm
- Finally we can then compare that to the Modtran model:
  - We find an excess extinction:
    - 0.2922 mag/airmass
    - 0.0929 mag/airmass
    - 0.0201 mag/airmass



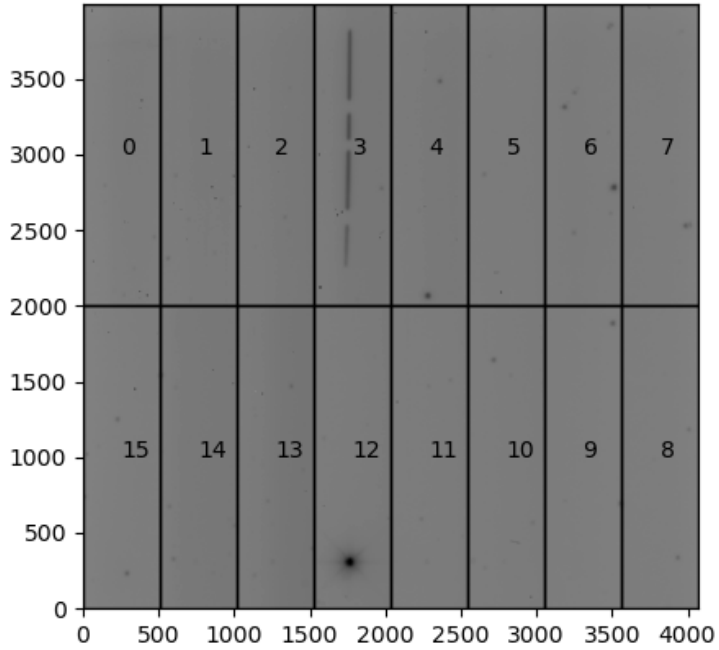
Results: HD185975 (a polar star)

- Much larger scatter colors
- Explanations?
  - Current guess is contaminating stars



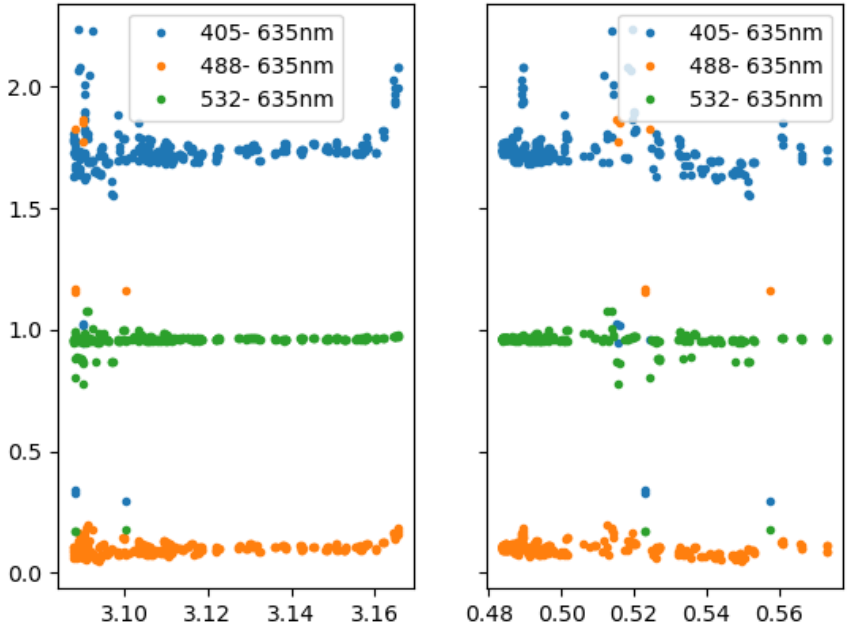
Future plans

- Currently we are working on figuring out the contamination.
  - Star overlap is our best guess!
- Good news, everybody!
  - Marc has a plan for dealing with star overlapping with the bands!
  - It will be implemented in September.
- We have more stars to look at:
  - HD 146233
  - HD 38949
  - HD 60753
  - HD 73495
- Until then we will just have remove the contaminated images.

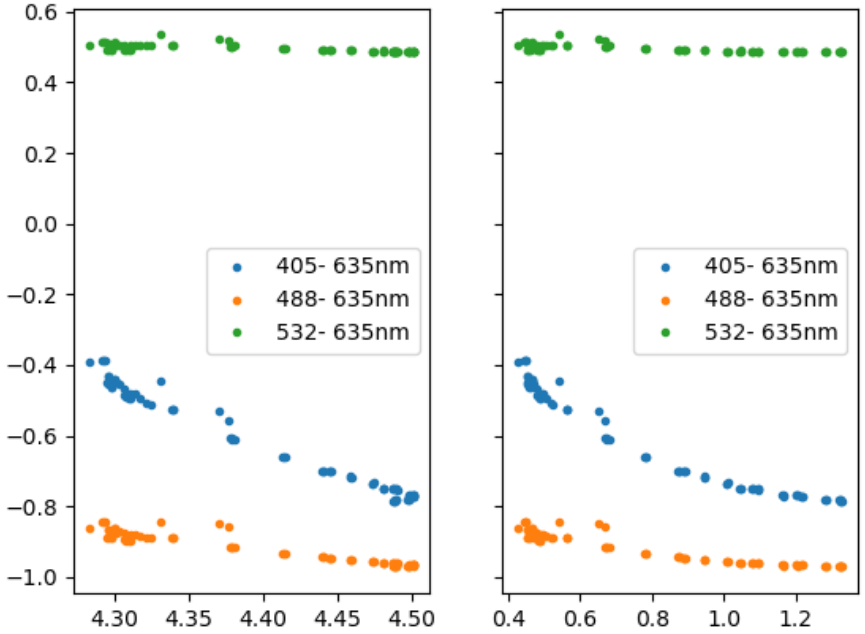


Sanity plots (azAlt)

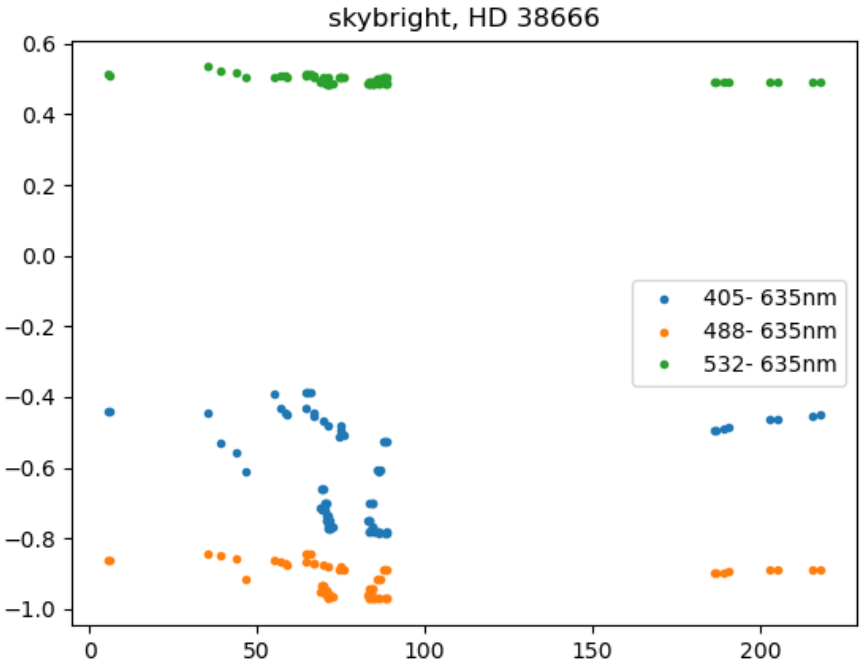
azAlt, HD 185975

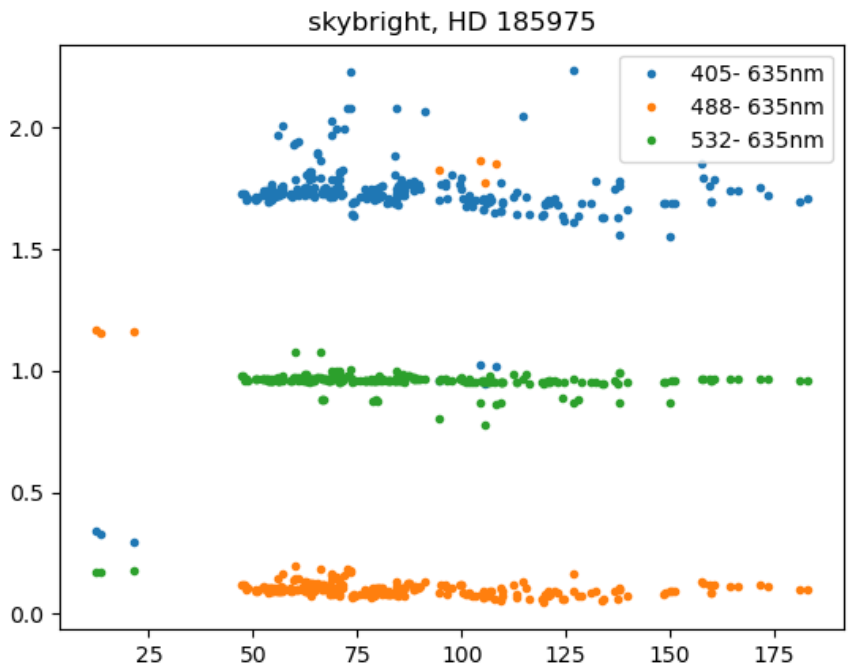


azAlt, HD 38666



Sanity plots (Skybright)





Sanity plots (fwhm)